

CLAIMS

WHAT WE CLAIM:

1. An apparatus for performing circular group-wise parallel interference cancellation in CDMA system that includes a plurality of detectors connected in parallel, each of the detectors including a plurality of fingers receiving signals, estimating the power of the received signal, outputting the estimated power, and demodulating the received signal on a corresponding path; and a maximal ratio combiner combining the received signal on each path demodulated by the fingers according to a maximal ratio combining method, and outputting soft bit decision value, the apparatus comprising:

a rank decision part receiving the soft bit decision value of the maximal ratio combiner of each detector and the power estimation value of the received signal generated by each finger of each detector, and determining the rank of the received signal of each path; and

a finger selector receiving a rank decision signal generated by the rank decision part, and outputting a signal for selecting a predetermined number of fingers,

wherein the fingers selected by the finger selector generate and output base band signals of the received signal on the corresponding path, and the base band signals generated from the selected fingers are added to obtain a sum value of the base band signals, the sum value is subtracted from the received signal to perform the group-wise interference cancellation.

2. The apparatus according to Claim 1, wherein the rank decision part comprises:

a weight value endowing part for endowing a weight values to both the output value of the maximal ratio combiner of each detector and the power estimation value of the received signal generated by each finger of the detector;

a plurality of adders for adding weighted absolute value (or square value) of the soft bit decision value of the maximal ratio combiner to the weighted power estimation value of the finger; and

a rank part for determining the rank of the received signal on each path according to the magnitude of the output values of the plurality of adders.

3. The apparatus according to Claim 1, wherein the rank decision part comprises:

a plurality of multipliers for multiplying the absolute value (or a square value) of the soft bit decision value of the maximal ratio combiner of each detector by the power estimation value of each finger; and

a rank part for determining the rank of the received signal on each path according to the magnitude of the output values of the plurality of multipliers.

4. A method for performing group-wise parallel interference cancellation in CDMA system that includes a plurality of detectors connected in parallel, each of the detector including a plurality of fingers receiving signals, estimating the power of the received signal, outputting the estimated power, and demodulating the received signal on a corresponding path; and a maximal ratio combiner combining the received signal on each path demodulated by the fingers according to a maximal ratio combining method, and outputting soft bit decision value, the method comprising:

(a) calculating the soft bit decision value of the maximal ratio combiner of each detector and the power estimation value of the received signal generated by each finger of each detector, and determining the rank of the received signal of each path according to the magnitude of the calculated values; and

(b) selecting predetermined number of the fingers according to the rank determined in the step (a),

wherein the fingers selected in said step (b) generate a base band signal of the received signal of the corresponding path and output the base band signal, and the base band signals generated by the selected fingers are added to obtain a sum value of the base band signals, and the sum value is subtracted from the received signal.

5. The method according to Claim 4, wherein the step (a) of determining the rank of the received signal of each path comprises:

(a') applying weight values to both the soft bit decision value of the maximal ratio combiner of each detector and the power estimation value of the received signal generated by each finger of the detector;

(b') adding weighted absolute value (or square value) of the soft bit decision value of the maximal ratio combiner and to the weighted power estimation value of the finger; and

(c') determining the rank of the received signal on each path according to the magnitude of the result value of the step (b').

6. The method according to Claim 4, wherein the step (a) of determining the rank of the received signal of each path comprises:

(i) multiplying an absolute value (or a square value) of the soft bit decision value of the maximal ratio combiner of each detector by the power estimation value of each finger; and

(ii) determining the rank of the received signal on each path according to the magnitude of the value obtained in said step (i).

7. A grouping method for performing cancellation interference in CDMA system that includes a plurality of detectors connected in parallel, each of the detector including a plurality of fingers receiving signals, estimating the power of the received signal, outputting the estimated power, and demodulating the received signal on a corresponding path; and a maximal ratio combiner combining the received signal on each path demodulated by the fingers according to a maximal ratio combining method, and outputting soft bit decision value, the method comprising:

a1) calculating a soft bit decision value of the maximal ratio combiner of each detector and a power estimation value of the received signal generated by each finger of the detector, and determining the rank of the received signal of each path; and

b1) selecting fingers needed for the interference cancellation according to the rank determined in the step (a1),

whereby the selected fingers are grouped to perform the interference cancellation.

8. The grouping method according to Claim 7, wherein the step (a1) of determining the rank of the received signal of each path comprises:

(a') applying weight values to both the soft bit decision value of the maximal ratio combiner of each detector and the power estimation value of the received signal generated by each finger of each detector;

(b') adding weighted absolute value (or square value) of the soft bit decision value of the maximal ratio combiner to the weighted power estimation value of the finger; and

(c') determining the rank of the received signal on each path according to the magnitude of the result value of the step (b'), and grouping the signals according to the determined rank.

9. The grouping method according to Claim 7, wherein the step (a1) of determining the rank of the received signal of each path comprises:

(i') multiplying an absolute value (or a square value) of the soft bit decision value of a maximal ratio combiner of each detector by the power estimation value of each finger; and

(ii') determining the rank of the received signal on each path according to the magnitude the value obtained in said step (i'), and grouping the signals according to the determined rank.